LUMINARY Memo #175

To: Distribution
From: D. Densmore
Date: 13 October 1970
Subject: LUMINARY Revision 182

Revision 182 implemented PCRs 324 and 340; ACBs L-28, L-31, L-32, L-35 and L-36; and Anomalies L-1D-01, L-1D-04, L-1D-06, and L-1D-12.

1) PCR 324 - To provide the AGS with rendezvous radar data via the PGNCS to AGS downlink telemetry line for the AGS Automatic RR Update program.

   a) Double precision constants CSTODAY and RCB-13 (used only in interpretive) were moved from fixed bank 05 to bank 15 to make room in bank 5 for the implementation of PCR 324.

   b) The Rendezvous downlist was changed to supply rendezvous radar data to the AGS. Words 9-17 were affected.

   c) The erasable AGSCODE is loaded with 17777 for set configuration, low scale or 57777 for set configuration, high scale when the rendezvous radar is being read and the data good discrete has been verified to be on.

   d) AGSCODE is reset in R61LM because of timing considerations as outlined in the PCR.

2) PCR 340 - Reverse the sign of LATVEL on the cross-pointer, ascent and descent. SIN and COS of AOG are picked up with a CS rather than CA; VVECTY and VSURFACE +2 are picked up with DCS instead of DCA.

3) PCR 896 (LR velocity read centered at PIPTIME) - An initialization in Fresh Start for the old (pre-PCR 896) use of the erasable SAMPLIM was deleted.

4) ACB L-28 - Changes to correct minor incorrect implementations.

    a) The initialization of LRPOS in P63 was unnecessary and incorrect besides.

    b) Change a DOUBLE to a DDOUBL and a DXCH to an XCH in the throttle control routines to improve accuracy. Again the implementation had been incorrect.

5) ACB L-31 (Make all locations used in the downlink lists be referenced in the symbol directory).

All the quantities sent by downlink but not referenced by name in the downlink control lists and sublists (because they are low-order halves of words or indirectly referenced with a multiple DNADR) are referenced as equal to special downlink tags "DL101"-"DL611".

6) ACB L-32 (Make a check against moving erasable locations that must be defined in certain relationships to other erasables. A move that would disrupt such a relationship should cause a cuss).

A new log section (CHECK= LIST) was added to the subroutine LUMERASE. The new assembler op code CHECK= defines for the assembler the relative positions of the specified erasables and if this is changed in the erasable assignment section a cuss will result on the CHECK= instruction rendered false. Example:

    VSELECT   CHECK=   AOG   +1

This is primarily useful to keep erasables downlinked together contiguous but should be used wherever relative position matters.

7) ACB L-35 (Store triple precision instead of vector mode into OLDPIPAX).

Coding was changed in the Lunar Landing Guidance Equations in order to avoid confusion and possible future problems. It was formerly necessary that erasables and instructions be in such an order that DELVROD could be initialized in such a way as to overwrite the garbage written into it when OLDPIPAX (triple precision erasable)

was vector stored. DELVROD had to follow OLDPIPAX in erasable (overlap the "vector") and it must be initialized after OLDPIPAX. The new coding, in the same number of words, stores triple precision and avoids all the problems.

8) ACB L-36 - Define a tag TMPDV = GDT/2 for use by S34/35.5 which now uses GDT/2 directly in order to avoid future errors by specifying that there is a user other than SERVICER for that erasable. TMPDV was defined in the erasable assignments log section.

9) Anomaly L-1D-01 (bias in attitude error needles if IMU error counters are enabled during DAP turn-on).

RCSFLAGS Bit 3 was set to call for the initialization of NEEDLER whenever NEEDLER is not being done (that is, when the DAP is "off" and/or when the IMU is not usable). Formerly the setting of the bit was bypassed anytime the mode select switch was off. If the switch was turned on and the IMU was found usable it would go at once to do NEEDLER without specifying initialization passes. Now the bit is set on any pass the mode select is found to be off, as well as when the switch is on but the IMU is unusable.

10) Anomaly L-1D-04 (P25 will not control spacecraft attitude if range to CSM is greater than 566 N.M.).

The check for RNDVZFLG on was restored to the LPS20.1 subroutine, so as to bypass the vector shifting if the program is P25. It is not applicable to check for range > 566 N.M. in P25.

11) Anomaly L-1D-06 (Restart protect DVTOTAL).

a) A temporary storage location in erasable called DVTEMP was defined. It was set equal to UPBUFF.

b) The old DVTOTAL plus the increment is stored in DVTEMP; a phase change is done; then DVTEMP is picked up and double exchanged with DVTOTAL.

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12) Anomaly L-1D-12 (Problems with V41N72).

    a) V44 was changed to check for RR reposition in progress as well as for remode in progress before disabling the RR error counters. This was done so that if R85 is doing a reposition V44 won't disable the error counters stopping the rate drive and hanging up V41 waiting for reposition bit to be reset.

    b) V41 was changed to reset "continuous designate" and "designation in progress" bits directly instead of calling CLRADMOD which also disabled the error counters. This restored the logic to what it was before ACB L-15 made that change to save needed words in the bank. The disabling of the error counters could stop a reposition R85 had in progress, hanging up V41 later when it tests reposition flag and waits for it to be reset.

13) A TWIDDLE call in the radar lead-in routines (the once-a-second call of itself in RADSAMP) was followed by a CADR rather than the usual "ADRES". Because the bank involved was 15, it was benign. In a case like this, when a CADR is used instead of an ADRES, T3RUPT does a DTCB with the CADR in A and the proper BBCON in L. Depending on the values of bits 12 & 11 an incorrect branch can take place. Fixed-fixed addresses are all right, as are all odd-numbered fixed-switched banks except 13, 23, 33 and 43.

The following sections of the GSOP should be examined for impact:

Section 2 - item 1

        3 - item 9

        4 - items 10, 12

        5 - item 2